

CLAIMS

What is claimed is:

1. A method of improving synthesized speech quality comprising:
obtaining an input speech signal;
5 coding said input speech using a Code Excited Linear Prediction coder to
generate code parameters for synthesis of said input speech; and
using a voicing index representing a characteristic of said input speech in
enhancing said synthesis of said input speech.
- 10 2. The method of claim 1, wherein said characteristic of said input speech
is periodicity of said input speech.
3. The method of claim 1, wherein said enhancing said synthesis of said
input speech is by controlling an adaptive highpass filter with said voicing index to
15 enhance high frequency region during said coding.
4. The method of claim 1, wherein said enhancing said synthesis of said
input speech is by controlling an adaptive perceptual weighting filter in said Code
Excited Linear Prediction coder with said voicing index.
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5. The method of claim 1, wherein said enhancing said synthesis of said
input speech is by controlling an adaptive Sinc window used in said Code Excited
Linear Prediction coder for pitch contribution with said voicing index.
- 25 6. The method of claim 1, wherein said enhancing said synthesis of said

input speech is by controlling spectrum tilt of said input speech by short-term enhancement of a fixed-codebook of said Code Excited Linear Prediction coder with said voicing index.

5 7. The method of claim 1, wherein said enhancing said synthesis of said input speech is by controlling a perceptual weighting filter of said Code Excited Linear Prediction coder with said voicing index.

 8. The method of claim 1, wherein said enhancing said synthesis of said
10 input speech is by controlling a linear prediction coder of said Code Excited Linear Prediction coder with said voicing index.

 9. The method of claim 1, wherein said enhancing said synthesis of said input speech is by controlling a pitch enhancement fixed-codebook of said Code
15 Excited Linear Prediction coder with said voicing index.

 10. The method of claim 1, wherein said enhancing said synthesis of said input speech is by controlling post pitch enhancement of said Code Excited Linear Prediction coder with said voicing index.

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 11. The method of claim 1, wherein said voicing index selects at least one sub-codebook from a plurality of sub-codebooks of said Code Excited Linear Prediction coder based on said characteristic of said input speech signal.

25 12. A method of improving synthesized speech quality comprising:

obtaining code parameters of an input speech signal;
obtaining a voicing index for use in enhancing synthesis of said input speech
signal from said code parameters; and
processing said code parameters through a Code Excited Linear Prediction
5 coder using information provided by said voicing index to generate a synthesized
version of said input speech signal.

13. The method of claim 12, wherein said voicing index provides
periodicity of said input speech signal.

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14. The method of claim 12, wherein said voicing index provides
characteristics of an adaptive highpass filter used to enhance high frequency region of
said excitation during generation of said code parameters for said input speech.

15 15. The method of claim 12, wherein said voicing index provides
characteristics of an adaptive perceptual weighting filter used to enhance perceptual
quality of said input speech during generation of said code parameters for said input
speech.

20 16. The method of claim 12, wherein said voicing index provides
characteristics of an adaptive Sinc window for pitch contribution used to enhance
perceptual quality of said input speech during generation of said code parameters for
said input speech.

25 17. The method of claim 12, wherein said enhancing synthesis of said input

speech is by controlling spectrum tilt of said input speech by short-term enhancement of a fixed-codebook of said Code Excited Linear Prediction coder with said voicing index.

5 18. The method of claim 12, wherein said enhancing of said synthesis of said input speech is by controlling a linear prediction coder filter of said Code Excited Linear Prediction coder with said voicing index.

10 19. The method of claim 12, wherein said enhancing of said synthesis of said input speech is by controlling a pitch enhancement fixed-codebook of said Code Excited Linear Prediction coder with said voicing index.

15 20. The method of claim 12, wherein said enhancing said synthesis of said input speech is by controlling post pitch enhancement of said Code Excited Linear Prediction coder with said voicing index.

20 21. The method of claim 12, wherein said voicing index selects at least one sub-codebook from a plurality of sub-codebooks of said Code Excited Linear Prediction coder based on said characteristic of said input speech signal.

25 22. An apparatus for improving synthesized speech quality comprising:
an input speech signal;
a Code Excited Linear Prediction coder for coding said input speech signal to generate code parameters for synthesis of said input speech; and
a voicing index having a characteristic of said input speech for use in

enhancing said synthesis of said input speech.

23. The apparatus of claim 22, wherein said characteristic of said input speech is periodicity of said input speech.

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24. The apparatus of claim 22, wherein said characteristic of said input speech is a characteristic of an adaptive highpass filter used to enhance high frequency region of said excitation during said coding.

10 25. The apparatus of claim 22, wherein said characteristic of said input speech is a characteristic of an adaptive perceptual weighting filter used in said Code Excited Linear Prediction coder.

15 26. The apparatus of claim 22, wherein said characteristic of said input speech is a characteristic of an adaptive Sinc window used in said Code Excited Linear Prediction coder.

20 27. The apparatus of claim 22, wherein said voicing index selects at least one sub-codebook from a plurality of sub-codebooks of said Code Excited Linear Prediction coder based on said characteristic of said input speech signal.

28. An apparatus for improving synthesized speech quality comprising:
a set of code parameters of an input speech signal;
a voicing index for use in enhancing synthesis of said input speech signal from
25 said code parameters; and

a Code Excited Linear Prediction coder using said code parameters and information provided by said voicing index to generate a synthesized version of said input speech signal.

5 29. The apparatus of claim 28, wherein said voicing index provides periodicity of said input speech signal.

 30. The apparatus of claim 28, wherein said voicing index provides characteristics of a highpass filter used to enhance high frequency region of said
10 excitation during generation of said code parameters for said input speech.

 31. The apparatus of claim 28, wherein said voicing index provides characteristics of an adaptive perceptual weighting filter used to enhance perceptual quality of said input speech during generation of said code parameters for said input
15 speech.

 32. The apparatus of claim 28, wherein said voicing index provides characteristics of an adaptive Sinc window used to enhance perceptual quality of said input speech during generation of said code parameters for said input speech.
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 33. The apparatus of claim 28, wherein said voicing index selects at least one sub-codebook from a plurality of sub-codebooks of said Code Excited Linear Prediction coder based on characteristics of said input speech signal.

25 34. A method of improving synthesized speech quality comprising:

generating a plurality of frames from an input speech signal;
coding each frame of said plurality of frames using a Code Excited Linear
Prediction coder to generate code parameters for synthesis of said each frame of said
input speech; and
5 transmitting a voicing index having a plurality of bits indicative of a
classification of said each frame of said input speech.

35. The method of claim 34, wherein said plurality of bits are three bits.

10 36. The method of claim 34, wherein said classification is indicative of
periodicity of said input speech signal.

37. The method of claim 34, wherein said classification is indicative of an
irregular voiced speech signal.

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38. The method of claim 34, wherein said classification is indicative of a
periodic index.

39. The method of claim 38, wherein said periodic index ranges from low
20 periodic index to high periodic index.

40. A method of improving synthesized speech quality comprising:
receiving a frame of an input speech signal, said frame having a plurality of
code parameters and a voicing index, wherein said voicing index comprises a plurality
25 of bits;

determining a classification for said frame of said input speech signal from said plurality of bits of said voicing index; and

decoding said frame using a Code Excited Linear Prediction coder based on said classification to synthesize said input speech.

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41. The method of claim 40, wherein said plurality of bits are three bits.

42. The method of claim 40, wherein said classification is indicative of a noisy speech signal.

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43. The method of claim 40, wherein said classification is indicative of an irregular voiced speech signal.

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44. The method of claim 40, wherein said classification is indicative of a periodic index.

45. The method of claim 44, wherein said periodic index ranges from low periodic index to high periodic index.

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